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A New Species of Psychrolutid Fish from Western Australia

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Abstract *Psychrolutes occidentalis*, a new species of psychrolutid fish, is described from mud bottoms at depths of 350–740 m on the continental slopes around Rowley Shoals, northwestern Australia. The new species is illustrated and compared with other species of the genus *Psychrolutes*. It differs from other species in the following characters: 14–15 dorsal soft rays, 21–23 pectoral rays, 30–31 vertebrae, no cirri on head and body, lateral line not emerging through tubes, and reddish brown head and body color with darker brown marblings. Aspects of the zoogeography of this new species from the tropical region and of the other species of *Psychrolutes* are discussed.

Psychrolutid fishes have been known since 1861 when Günther described *Psychrolutes paradoxus* from the northeastern Pacific. Later, several other species were described from different parts of the world. They are degenerate (body limp, bones not ossified) benthic cottoids which live on soft bottoms, mostly below 300 m.

Taranets (1941) listed 10 genera in the family and thought it to be a probable link between the Cottidae and the Liparididae and the Cyclopteridae. The latest revision was by Nelson (1982), who provisionally distinguished a hard-headed subfamily Cottunculinae, and a soft-headed subfamily Psychrolutinae. In the present paper, I follow Nelson's (1982) classification.

Nelson (1977) reviewed the taxonomic history of the Australasian psychrolutids then recognized in *Neophrynichthys* Günther, 1876. Presently, five species of psychrolutids are known from around Australia, New Zealand and Macquarie Island; two species occur around New Zealand, two at Macquarie Island, and one along the eastern coast of Australia.

Recently, specimens of a psychrolutid fish distinct from the east Australian *Psychrolutes marcidus* (McCulloch, 1926) and from other species, were trawled off Western Australia. The new species is described in the present paper.

Methods follow Nelson (1977; 1982). Counts of fin rays follow Fricke (1983). The type material is deposited in the Western Australian Museum, Perth (WAM) and in the Australian Museum, Sydney (AMS). The materials of other species which were examined for comparison are deposited in AMS, in the Institut für Seefischerei, Hamburg (ISH), the Oregon State University, Corvallis, U. S. A. (OSUO), and the Scripps Institution of Oceanography, La Jolla, U. S. A. (SIO).

Comparative material: *Psychrolutes inermis*, ISH 217/67(2); *P. marcidus*, AMS 17867-004(3), AMS 18766-001(1), AMS 20542-001(2), AMS 21724-001(1); *P. marmoratus*, ISH 787/66(1), ISH 788/66(1); *P. paradoxus*, OSUO 2394–2396; *P. phrictus*, OSUO 1839 (holotype), OSUO 1524, OSUO 2020, OSUO 2021, OSUO 2029, OSUO 2040, OSUO 2057, OSUO 2221; *P. sio*, SIO 72-184 (holotype), SIO 80-35(1).

Psychrolutes (*Cottunculoides*) *occidentalis* sp. nov.

(Western Australian sculpin)

(Fig. 1)

Material examined. Holotype: WAM P25395-014, male, 110.6 mm SL, Western Australia, approximately 35 km E of Rowley Shoals, 17°17′S 119°57′E, 350 m depth, R/V "Umitaka Maru", 20 Dec. 1969. Paratypes: WAM P28074-001, 1 female, 77.0 mm SL, Western Australia, approximately 40 km SW of Rowley Shoals, 17°42′S 118°38′E, 402–404 m depth, N. Sinclair and P. Berry, 18 Aug. 1983. WAM P28133-001, 1 female, 114.5 mm SL, Western Australia, approximately 200 km NE of Rowley Shoals, 16°01′S 120°33′E, 420 m depth, N. Sinclair, 5 Sep. 1983. AMS I. 22809-006, 1 specimen, NW shelf of Australia, 250 km NW of Port Headland, 18°40′S 116°42′E, 584–592 m depth, J. Paxton, R/V "Soela," 4 Apr. 1982. AMS I. 22814-003, 3 specimens, NW shelf of Australia, 250 km NW of Port Headland, 18°29′S 116°36′E, 696–704 m depth, mud bottom, J. Paxton, R/V "Soela," 6 Apr. 1982.

Diagnosis. A species of *Psychrolutes* with 8 dorsal spines and 14–15 dorsal rays, 11–13 anal

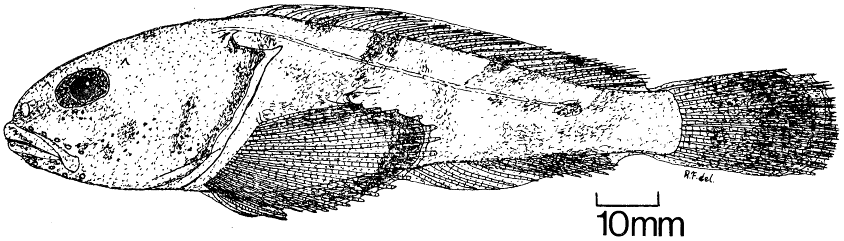

Fig. 1. *Psychrolutes occidentalis* sp. nov., holotype, male, 110.6 mm SL, WAM P25395-014, east of Rowley Shoals, Western Australia. Lateral view. (Fin rays not visible without removing the skin; small dots indicate darker pigmentation; no cirri on sides of head and body.)

Table 1. Morphometrics and meristics of the holotype and two WAM paratypes of *Psychrolutes occidentalis* sp. nov. (proportions expressed as thousandths of SL). $^{1)}$ Measured from tip of upper lip.

	Holotype WAM P25395-014, male	Paratype WAM P28074-001, female	Paratype WAM P28133-001, female
Standard length$^{1)}$ (mm)	110.6	77.0	114.5
Total length$^{1)}$ (mm)	137.4	96.7	141.2
Body depth	258	258	271
Caudal peduncle depth	86	63	58
Caudal peduncle length	152	196	143
Predorsal length$^{1)}$	402	421	354
Pectoral fin length	272	291	262
Pelvic fin length	120	130	153
Head length$^{1)}$ (to upper end of gill opening)	345	372	312
Head length$^{1)}$ (to hind margin of opercular flap)	398	422	377
Head width	241	209	240
Snout length$^{1)}$	58	84	76
Interorbital width	146	79	93
Eye diameter	77	136	92
Upper jaw length	161	169	145
Preanal fin length$^{1)}$	593	605	558
Prepectoral fin length$^{1)}$	371	414	363
Prepelvic fin length$^{1)}$	309	301	279
1st D spine	46	85	60
4th D spine	110	115	100
1st D ray	90		118
5th D ray	111	117	147
Last D ray	72	115	78
1st A ray	74	49	81
5th A ray	108	107	106
Last A ray	85	80	101
Caudal fin length	242	254	233
D	VIII, 14	VIII, 14	VIII, 15
A	x, 1	xii, 1	xii, 1
P_1	xxi–xxii	xxii–xxiii	xxi–xxii
C	(i), ii, 8, ii, (i)	(ii), ii, 9, ii, (ii)	(ii), ii, 9, i, (ii)

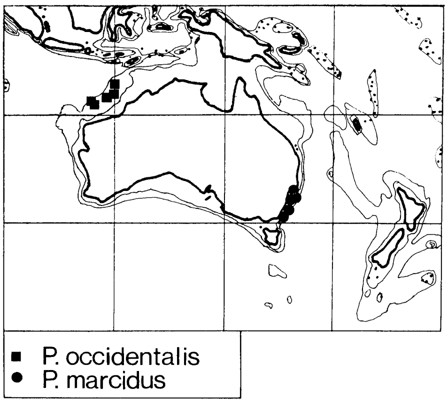

Fig. 2. Geographical distribution of the Australian species of *Psychrolutes*, *P. occidentalis* sp. nov. and *P. marcidus* (the records of *P. marcidus* are based on unpublished AMS material). The 200 m and 1,000 m depth lines are shown.

rays, 21–23 pectoral rays, 30–31 vertebrae, no cirri on head and body, lateral line not emerging through tubes, a reddish brown color pattern with darker brown marblings, and dark gray pectoral and caudal fins.

Description. D VIII, 14–15. A x, 1–xii, 1. P_1 xxi–xxiii. P_1 I, 3. C (i–ii), ii, 8–9, ii, (i–ii); principal rays 12–13. Branchiostegal rays 7. Vertebrae 30–31. Paired ribs 11–12. Morphometrics and meristics (expressed as thousandths of SL) given in Table. 1.

Head and body very soft, head profile sloping gently. Head length (to end of opercular flap) 2.37–2.65 in SL. Body depth 3.68–3.88 in SL. Body width 4.15–4.78 in SL. Eyes dorsolateral. Eye diameter 2.72–4.46 in head. Preorbital length 4.09–4.81 in head. Interorbital area slightly rounded. Interorbital width 2.36–4.70 in head. A small preocular and a postocular spine on each side of the head (developed as a ridge of an underlying arch). Five bony arches dorsally on cranium; 3rd arch largest, broad. Suborbital stay robust, not elongate. Postcleithrum present. Upper jaw slightly projecting over lower jaw. Maxillary length 2.15–2.20 in head. Vomerine teeth absent; teeth developed on the premaxillary (3 rows), on the dentary (3 rows) and on the pharyngeals. Terminal chin pores paired. Skin thin, very loose. No cirri on sides of head and body. Anus on a vertical below base of 7th D spine; length from snout to anus 1.72–1.80 in SL. Lateral line consisting of a shallow groove only, reaching to below end of dorsal fin. Caudal peduncle depth 11.63–17.20 in SL. Caudal peduncle length 5.12–6.99 in SL.

All fins covered with skin. Dorsal fin base length (as revealed by dissection and radiograph) 2.00–2.06 in SL. Fourth dorsal spine 8.72–10.00 in SL. First dorsal ray 8.47–11.13 in SL, 5th ray 6.81–9.02 in SL, last ray 8.72–13.86 in SL. Predorsal fin length 2.38–2.83 in SL. Anal fin base length 4.25–4.54 in SL. First anal fin ray 12.31–20.27 in SL, 5th ray 9.22–9.48 in SL, last ray 9.87–12.45 in SL. Preanal fin length 1.65–1.79 in SL. Pectoral fin length 3.44–3.81 in SL. Prepectoral fin length 2.42–2.76 in SL. Pelvic fin length 6.55–8.32 in SL. Prepelvic fin length 3.24–3.58 in SL. Caudal fin distally slightly convex; caudal fin length 3.93–4.30 in SL.

Color in life: Reddish brown, mouth and

Table 2. Distinguishing characters of *Psychrolutes occidentalis* sp. nov., *P. marcidus* and *P. paradoxus*.

	P. occidentalis	*P. marcidus*	*P. paradoxus*
Vertebrae	30–31	32–33	34–35
D spines	VIII	VII	X–XII
P_1 rays	21–23	24–25	19–21
D rays	14–15	17–19	15–17
Body coloration	mottled with dark brown	uniform light gray	mottled with dark brown
P_1 coloration	light, with a dark margin	uniform light gray, with a whitish margin	light, with two dark bands and a light margin
Jaw position	upper jaw slightly protruding past lower jaw	jaws nearly terminal	jaws nearly terminal
Total length	up to 150 mm	up to 380 mm	up to 58 mm
Distribution	Western Australia (Indian Ocean)	Eastern Australia (Pacific Ocean)	North Pacific

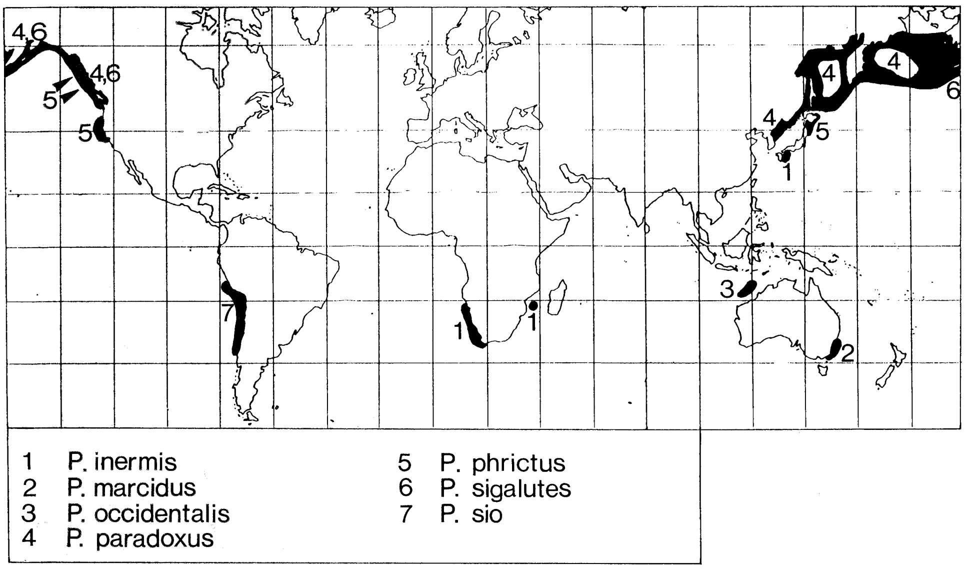

Fig. 3. Generalized geographical distribution of the species of *Psychrolutes*. (In southwestern Africa, two species, *P. inermis* and *P. macrocephalus*, are distributed.)

cheeks light red. Belly whitish. Back and sides of head and body with darker brown marblings. Eye yellowish. Second dorsal and anal fins distally dark gray. Pectoral and caudal fins distally dark gray, with a small whitish margin.

Color in alcohol: The yellowish and reddish colors fade to light gray. Color pattern shown in Fig. 1. Peritoneum pale.

Distribution. This species is known only from the continental slopes around Rowley Shoals off Western Australia (Fig. 2). It was trawled on soft bottoms at depths of 350–704 m.

Etymology. The Latin adjective *occidentalis* means "western." The name of the new species refers to the distribution in Western Australia, west of the distribution area of the other Australian species, *Psychrolutes marcidus*.

Relationships. *Psychrolutes occidentalis* sp. nov. belongs to the genus *Psychrolutes* Günther, 1861 as understood by Nelson (1982). It is externally similar (though not closely related) to *P. paradoxus* Günther, 1861 (occurring in the North Pacific Ocean between eastern Korea and British Columbia; Fig. 3), but is distinguished by the differences listed in Table 2. It differs from the only other species occurring in Australia, *P. marcidus* (McCulloch, 1926: 215–216, pl. 55, fig. 2; distributed along the coast of New South Wales; see Fig. 2) by the characters listed in Table 2.

The new species is distinguished from *P. inermis* (Vaillant, 1888) and from *P. macrocephalus* (Gilchrist, 1904) by the soft dorsal ray number (16–19 in *P. inermis*; 16 in *P. macrocephalus*), lacking cirri (which are present on the snout and around the mouth of *P. inermis* and *P. macrocephalus*), and the body and fin color pattern (uniform in *P. inermis* and *P. macrocephalus*). It differs from *P. phrictus* Stein et Bond, 1978 (pp. 1–9, figs. 1–2; distributed along the western coast of the U. S. A.; see Fig. 3) in its dorsal ray number (19–20 in *P. phrictus*), the usually lower pectoral ray number (22–26 in *P. phrictus*), the lateral line which does not emerge through pores, the lacking cirri on the head and the body, and the body color pattern (uniform in *P. phrictus*); from *P. sio* Nelson, 1980 (pp. 443–449; Nelson et al., 1985: 444–451; distributed between Peru and Chile; see Fig. 3) in the dorsal ray number (16–18 in *P. sio*), the vertebrae number (32–34 in *P. sio*), and the lack of any cirri on the head; from *P. sigalutes* (Jordan et Starks, 1895: 811–812; distributed in the northeastern Pacific Ocean; see Fig. 3) in the dorsal ray number (16–18 in *P. sigalutes*), the pectoral ray number (16 in *P. sigalutes*), the vertebrae number (34 in *P. sigalutes*), and the body and fin color pattern (uniform in *P. sigalutes*).

This new species possesses a postcleithrum and a robust suborbital stay. It therefore belongs to the subgenus *Cottunculoides* according to the classification of Nelson (1982). Other species of this subgenus are *P. inermis*, *P. marcidus*, *P. phrictus*, and *P. sio*.

Remarks. The genus *Psychrolutes* is most common in the North Pacific where its species inhabit wide areas (Fig. 3); nevertheless, a few species are found in limited areas of the southern hemisphere, including the southern parts of the Indian Ocean, as demonstrated by this new record of *P. occidentalis*, and by the record of *P. inermis* from the Mozambique Channel (Nelson, 1982). The distribution was previously thought to be antitropical but the Rowley Shoals specimens of *P. occidentalis* show a tropical occurrence, though in relatively cold, deep water. The distribution of the genus is therefore antiequatorial (sensu Randall, 1982) (Fig. 3).

A reason for the predominance of the northern hemisphere species might be that the genus originated there like cottid and agonid fishes, but this pattern may also simply be due to the area effect of the vast boreal coastlines in the North Pacific, while the southern hemisphere of today is nearly lacking such boreal coast areas. Apparently species of the genus do not occur in the Atlantic Ocean except for the West African distribution of *P. inermis* and *P. macrocephalus* (Fig. 3) which seems to be a boundary distribution with an Indo-Pacific origin. No species of *Psychrolutes* is known from the southwestern, central, or northern Atlantic (unless the SW Atlantic *Neophrynichthys marmoratus* turns out to be a *Psychrolutes*).

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ウェスタン・オーストラリアから得られたウラナイカジカ科の 1 新種

Ronald Fricke

オーストラリア北西部，Rowley Shoals 付近の大陸斜面の水深 350–740 m の泥底から，ウラナイカジカ科の 1 新種 *Psychrolutes occidentalis* が採集された．本種は背鰭軟条 14–15，胸鰭条 21–23，脊椎骨 30–31，体に皮質突起がない，側線孔は管状を呈さない，体は赤褐色で暗褐色斑があることなどにより，同属の他種と区別される．また，本種はウラナイカジカ属にとって熱帯海域からの初めての報告であるので，本属魚類の動物地理学的検討も行った．